Patent Claims

1. A control device for a work appliance comprising a scoop held on an extension arm, in particular for a wheeled loader,

- with two hydraulic cylinders, of which the first actuates the extension arm and the second actuates the scoop,
- with a pump supplying the cylinders with pressure medium from a tank, and
- with two valves, of which the first valve controls the supply of pressure medium from the pump to the first cylinder and the second valve controls the supply of pressure medium from the pump to the second cylinder,

characterized by the fact

that the valves (42, 41) can be activated in such a way that the ratio (Q_2/Q_1) of the pressure medium quantities (Q_2, Q_1) supplied to the two cylinders (22, 18) is held at a constant value (K_Q) independently of the size of the control signal (y_{st1}) supplied to the first valve (41).

2. The control device as claimed in claim 1, **characterized by the fact** that

- each valve (41, 42) is provided with a slide (47, 50) acted upon by an adjustable control pressure (p_{st1A} or p_{st1B}, p_{st2A} or p_{st2B}),
- that the control pressure (p_{st1A} or p_{st1B}, p_{st2A} or p_{st2B}) deflects the slide (47, 50) counter to the force of a spring

(48 or 49, 51 or 52), the position of the slides (47, 50) being a measure of the force resulting from the control pressures (p_{st1A} or p_{st1B}, p_{st2A} or p_{st2B}) acting on the slide (47, 50) and from the surfaces in each case acted upon by pressure,

- that each slide (47, 50) is provided with a notch which runs in its longitudinal direction and determines the size of the passage cross section (A_{A1} or A_{B1}, A_{A2} or A_{B2}) of the valve (41, 42) and which is formed in such a way that the respective passage cross section (A_{A1} or A_{B1}, A_{A2} or A_{B2}) of the valve (41, 42) is determined by the position of the slide (47, 50), and
- that each valve (41, 42) is assigned a pressure compensator (79, 85) which keeps the pressure drop (Δp_1, Δp_2) of the valves (41, 42) at the same value.

3. The control device as claimed in claim 2, **characterized by the fact** that the passage cross section (A_{A1} or A_{B1}, A_{A2} or A_{B2}) of the two valves (41, 42) changes linearly with the control pressure (p_{st1A} or p_{st1B}, p_{st2A} or p_{st2B}) supplied to them.

4. The control device as claimed in claim 2 or claim 3, **characterized by the fact** that that surface of the slide (47) of the first valve (41) which is acted upon by the control pressure (p_{st1A} or p_{st1B}) is equal to that surface of the slide (50) of the second valve (42) which is acted upon by the control pressure (p_{st2A} or p_{st2B}).

5. The control device as claimed in one of claims 2 to 4, **characterized by the fact** that the inlet of the second valve (42) for the control pressure (p_{st2A} or p_{st2B}) is preceded by a valve arrangement (65, 66; 68, 69), via which said valve can be supplied with the control pressure (p_{st1A}, p_{st1B}) for the rotational movement of the extension arm (12) or with the control pressure (p_{st3A}, p_{st3B}) for the rotational movement of the scoop (14).

6. The control device as claimed in claim 5, **characterized by the fact** that the valve arrangement is constructed as a shuttle valve (65, 68), one inlet of which can be supplied with the control pressure (p_{st1A}, p_{st1B}) for the rotational movement of the extension arm (12) and the other inlet of which is supplied with the control pressure (p_{st3A}, p_{st3B}) for the rotational movement of the scoop (14).

7. The control device as claimed in claim 6, **characterized by the fact** that, in the control pressure line (56, 57) leading to the first inlet of the shuttle valve (65, 68), a switching valve (66, 69) is arranged, which, in one position, interrupts the supply of the control pressure (p_{st1A}, p_{st1B}) for the rotational movement of the extension arm (12) to the inlet for the control pressure (p_{st2A}, p_{st2B}) of the second valve (42) and at the same time supplies the first inlet of the shuttle valve (65, 68) with a pressure (tank pressure) which is lower than the respective control pressure (p_{st3A}, p_{st3B}) for the rotational movement of the scoop (14) or

is equal to said control pressure.

8. The control device as claimed in one of claims 5 to 7, **characterized by the fact** that the valve arrangement (69*, 68) interrupts the supply of the control pressure (p_{st1B}) for the rotational movement of the extension arm (12) in the lowering direction to the inlet for the control pressure (p_{st2B}) of the second valve (42) when this pressure (p_{st1B}) overshoots an adjustable value (p_{sts}).

9. The control device as claimed in claim 8, **characterized by the fact** that the switching valve (66*) interrupts the supply of the control pressure (p_{st1A}) for the rotational movement of the extension arm (12) in the raising direction to the first inlet of the assigned shuttle valve (65) when the pressure (p_{st1B}) for the rotational movement of the extension arm (12) in the lowering direction overshoots an adjustable value (p_{sts}).

10. The control device as claimed in one of claims 2 to 9, **characterized by the fact** that the notch (95) of the slide (50) of the second valve (42) is formed in such a way that, when the slide (50) of the second valve (42) is acted upon by a control pressure (p_{st2A}, p_{st2B}) which is higher than the control pressure ($p_{st1A(65\%)}$, $p_{st1B(65\%)}$), required for the maximum pressure medium quantity (Q_{1max}), for the first valve (41), the passage cross section (A_{A2}, A_{AB2}) of the second valve (42) increases with a rise in control pressure (p_{st2A}, p_{st2B}) to a greater extent than in the range below the control pressure

($p_{st1A(65\%)}$, $p_{st1B(65\%)}$), required for the maximum pressure medium quantity (Q_1), for the first valve (41).

11. The control device as claimed in one of claims 2 to 9, **characterized by the fact** that the spring constant of the spring (48 or 49) acting on the first slide (47) is equal to the spring constant of the spring (50, 51) acting on the second slide (50).

12. The control device as claimed in one of claims 2 to 11, **characterized by the fact** that a counterholding valve (91, 87) controlled by the inflow pressure is arranged in a line (35, 39) leading from a cylinder (18, 22) acted upon by a pulling load to the tank (29).